

PATENT ABSTRACTS OF JAPAN

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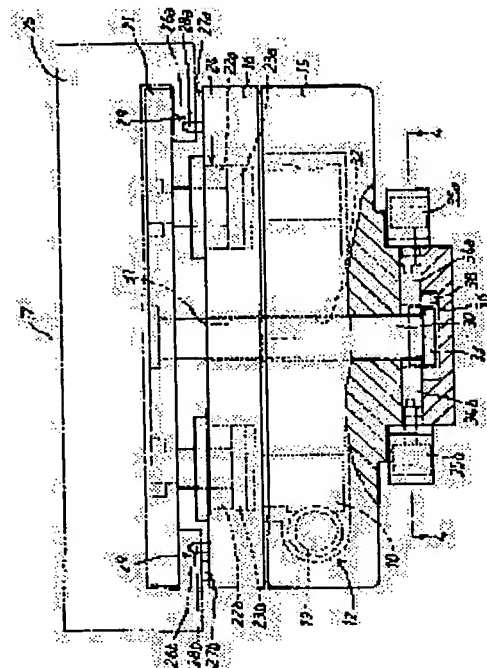
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(54) GRADIENT DIVIDING ROUND TABLE

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent rising of a clamber to prevent a pallet from sliding from a dividing round table, even if a selector valve for selecting an operation of a device for lifting the clamber lifting on the pallet is switched by a malfunction while a gradient table is divided at a gradient position on the gradient dividing round table.

SOLUTION: A safety member penetrating through a center hole in the dividing round table and extending to a base is fixed to the lower surface of the rising clamber, the rising of the clamber is prevented by interference with a locking part formed on the safety member at a locking position, a locking member for releasing the interference with the locking part at an unlocking position to allow the rising of the clamber is movably mounted to a base, the gradient table is divided at a null gradient angle position making the upper surface of the dividing round table horizontal, and the locking member is moved to the unlocking position only when the dividing round table is divided to the null dividing gradient angle position capable of delivering a pallet to the clamber.



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CLAIMS

[Claim(s)]

[Claim 1] The tilting rotary table supported by the main part at the rockable at the circumference of a level rocking axis, The rocking driving gear which makes this tilting rotary table rock to the circumference of the aforementioned rocking axis, The circular dividing table supported possible [rotation] around the aforementioned rocking axis and right-angled dividing axis of rotation by the base fixed to the aforementioned tilting rotary table in one, The rotation driving gear made to deduce and rotate this circular dividing table around the aforementioned dividing axis of rotation, The clasper constructed across possible [movement in the aforementioned dividing axis-of-rotation direction] on the aforementioned circular dividing table, A means to carry out rise-and-fall movement of this clasper, When carried in to the upper surface of a clasper where work was attached removable and went up In the tilting index circular table in which the inferior surface of tongue of this clasper and the engagement section which counters were prepared, and the pallet fixed in the state where the aforementioned engagement section was pressed by the clasper inferior surface of tongue by descent of the aforementioned clasper, and it was positioned by the positioning means on the aforementioned circular-dividing-table upper surface was formed The Safety Department material which penetrates the feed hole which fixed on the inferior surface of tongue of the aforementioned clasper, and was drilled in the aforementioned circular dividing table by the aforementioned dividing axis of rotation and the same axle, and extends to the aforementioned base, Interfere with the stop section which was constructed across the aforementioned base possible [movement] and was prepared in the aforementioned Safety Department material in the lock position, and elevation of the aforementioned clasper is prevented. The lock member which cancels interference with the aforementioned stop section in an unlocking position, and permits elevation of a clasper, the lock to which this lock member is moved between a lock position and an unlocking position -- a member -- with driving means While the aforementioned tilting rotary table is deduced in the tilt-angle nullity position where the upper surface of the aforementioned circular dividing table becomes level When the aforementioned circular dividing table is deduced from the side by the clasper which went up the aforementioned pallet in the dividing angle nullity position in which carrying-in appearance is possible alike -- the chisel aforementioned lock -- a member -- the tilting index circular table characterized by having the unlocking control means which move the aforementioned lock member to an unlocking position by driving means

[Claim 2] The tilting index circular table according to claim 1 characterized by establishing the security slot characterized by providing the following in the aforementioned base. It is opening which interferes with the aforementioned lock plate and prevents a rise of a lock plate when it considered as the lock plate which was able to prepare the aforementioned stop section in the soffit of the aforementioned Safety Department in one, it becomes in phase with the aforementioned lock plate, and a rise of this lock plate is permitted when deduced in the dividing angle predetermined position which the aforementioned circular dividing table deduces and includes an angle nullity position, and deduced in addition to a dividing angle predetermined position. The opening which permits rotation of the aforementioned lock plate when the aforementioned circular dividing table deduces and rotates, after the aforementioned clasper

has descended.

[Claim 3] The tilting rotary table which is characterized by providing the following and which was supported by the main part at the rockable at the circumference of a level rocking axis, The rocking driving gear which makes this tilting rotary table rock to the circumference of the aforementioned rocking axis, The circular dividing table supported possible [rotation] around the aforementioned rocking axis and right-angled dividing axis of rotation by the base fixed to the aforementioned tilting rotary table in one, The rotation driving gear made to deduce and rotate this circular dividing table around the aforementioned dividing axis of rotation, The clamper constructed across possible [movement in the aforementioned dividing axis-of-rotation direction] on the aforementioned circular dividing table, A means to carry out rise-and-fall movement of this clamper, When carried in to the upper surface of a clamper where work was attached removable and went up The tilting index circular table in which the undersurface of this clamper and the engagement section which counters were prepared, and the pallet fixed in the state where the aforementioned engagement section was pressed by the clamper undersurface by descent of the aforementioned clamper, and it was positioned by the positioning means on the aforementioned circular-dividing-table upper surface was formed. Safety Department material which penetrates the feed hole which fixed on the undersurface of the aforementioned clamper and was drilled in the aforementioned circular dividing table by the aforementioned dividing axis of rotation and the same axle, and extends to the aforementioned base. It is opening which interferes with the aforementioned lock plate and prevents elevation of a lock plate when the lock plate which is formed in the soffit of this Safety Department material in one, and extends horizontally was formed, it becomes in phase with the aforementioned lock plate, and elevation of this lock plate is permitted when the aforementioned circular dividing table deduces and it is deduced in an angle predetermined position, and deduced in addition to a dividing angle predetermined position. The opening which permits rotation of the aforementioned lock plate when the aforementioned circular dividing table deduces and rotates, after the aforementioned clamper has descended.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]
[The technical field to which invention belongs] this invention relates to the tilting index circular table with which a machine tool is equipped.

[0002]

[Description of the Prior Art] Support a tilting rotary table on a main part at a rockable at the circumference of a level rocking axis, and a circular dividing table is supported possible [rotation] around the aforementioned rocking axis and right-angled dividing axis of rotation in the aforementioned tilting rotary table. The clamber which goes up and down in the aforementioned dividing axis-of-rotation direction with an oil hydraulic cylinder is constructed across on the aforementioned circular dividing table. The pallet with which work is attached removable is carried in to the upper surface of a clamber which went up. The tilting index circular table which the aforementioned clamber descends, presses the engagement section of a pallet caudad, and fixes a pallet to the aforementioned circular-dividing-table upper surface is attached on the work table of machine tools, such as a machining center, and is used widely.

[0003]

[Problem(s) to be Solved by the Invention] If shown in such a conventional tilting index circular table, when the selector valve of an oil hydraulic cylinder which makes it go up and down a clamber was changed by the incorrect operation during processing, the clamber went up, the work on the pallet which changed into the unclamping state completely was processed by the tool, work may have been thrust down by cutting force and a tool or work may have been damaged. Moreover, when a tilting rotary table was deduced in an inclination position, the upper surface of a circular dividing table inclined and the aforementioned selector valve was changed by the incorrect operation, the aforementioned clamber went up, and while the pallet might slide down from the circular dividing table and was dangerous for the operator, there was a possibility of damaging a machine tool.

[0004]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the constitutional feature of invention according to claim 1 The tilting rotary table supported by the main part at the rockable at the circumference of a level rocking axis. The rocking driving gear which makes this tilting rotary table rock to the circumference of the aforementioned rocking axis. The circular dividing table supported possible [rotation] around the aforementioned rocking axis and right-angled dividing axis of rotation by the base fixed to the aforementioned tilting rotary table in one, The rotation driving gear made to deduce and rotate this circular dividing table around the aforementioned dividing axis of rotation. The clamber constructed across possible [movement in the aforementioned dividing axis-of-rotation direction] on the aforementioned circular dividing table, A means to carry out rise-and-fall movement of this clamber. When carried in to the upper surface of a clamber where work was attached removable and went up In the tilting index circular table in which the inferior surface of tongue of this clamber and the engagement section which counters were prepared, and the pallet fixed in the state where the aforementioned engagement section was pressed by the clamber inferior surface

of tongue by descent of the aforementioned clamber, and it was positioned by the positioning means on the aforementioned circular-dividing-table upper surface was formed The Safety Department material which penetrates the feed hole which fixed on the inferior surface of tongue of the aforementioned clamber, and was drilled in the aforementioned circular dividing table by the aforementioned dividing axis of rotation and the same axle, and extends to the aforementioned base, interfere with the stop section which was constructed across the aforementioned base possible [movement] and was prepared in the aforementioned Safety Department material in the lock position, and elevation of the aforementioned clamber is prevented. The lock member which cancels interference with the aforementioned stop section in an unlocking position, and permits elevation of a clamber, the lock to which this lock member is moved between a lock position and an unlocking position -- a member -- with driving means While the aforementioned tilting rotary table is deduced in the tilt-angle nullity position where the upper surface of the aforementioned circular dividing table becomes level the time of the aforementioned circular dividing table being deduced from the side by the clamber which went up the aforementioned pallet in the dividing angle nullity position in which carrying-in appearance is possible -- the aforementioned lock -- a member -- it is having had the unlocking control means which move the aforementioned lock member to an unlocking position by driving means [0005] The constitutional feature of invention concerning a claim 2 is set to a tilting index circular table according to claim 1. It considers as the lock plate which was able to prepare the aforementioned stop section in the soffit of the aforementioned Safety Department in one. When deduced in the dividing angle predetermined position which the aforementioned circular dividing table deduces and includes an angle nullity position, become in phase with the aforementioned lock plate, and elevation of this lock plate is permitted. Opening which interferes with the aforementioned lock plate and prevents elevation of a lock plate when deduced in addition to a dividing angle predetermined position. After the aforementioned clamber had descended, when the aforementioned circular dividing table deduced and rotated, the security slot which has the opening which permits rotation of the aforementioned lock plate was established in the aforementioned base.

[0006] The tilting rotary table supported by the main part at the rockable at the circumference of a rocking axis with the constitutional level feature of invention concerning a claim 3. The rocking driving gear which makes this tilting rotary table rock to the circumference of the aforementioned rocking axis. The circular dividing table supported possible [rotation] around the aforementioned rocking axis and right-angled dividing axis of rotation by the base fixed to the aforementioned tilting rotary table in one, The rotation driving gear made to deduce and rotate this circular dividing table around the aforementioned dividing axis of rotation. The clamber constructed across possible [movement in the aforementioned dividing axis-of-rotation direction] on the aforementioned circular dividing table, A means to carry out rise-and-fall movement of this clamber. When carried in to the upper surface of a clamber where work was attached removable and went up In the tilting index circular table in which the inferior surface of tongue of this clamber and the engagement section which counters were prepared, and the pallet fixed in the state where the aforementioned engagement section was pressed by the clamber inferior surface of tongue by descent of the aforementioned clamber, and it was positioned by the positioning means on the aforementioned circular-dividing-table upper surface was formed The Safety Department material which penetrates the feed hole which fixed on the inferior surface of tongue of the aforementioned clamber, and was drilled in the aforementioned circular dividing table by the aforementioned dividing axis of rotation and the same axle, and extends to the aforementioned base. The lock plate which is formed in the soffit of this Safety Department material in one, and extends horizontally is formed. When the aforementioned circular dividing table deduces and it is deduced in an angle predetermined position, become in phase with the aforementioned lock plate, and elevation of this lock plate is permitted. Opening which interferes with the aforementioned lock plate and prevents elevation of a lock plate when deduced in addition to a dividing angle predetermined position. After the aforementioned clamber has descended, when the aforementioned circular dividing table deduces and rotates, it is having established the security slot which has the opening which permits rotation of the aforementioned

lock plate in the aforementioned base.

[0007]

[Function and Effect of the Invention] In invention concerning the claim 1 constituted as mentioned above, while the aforementioned tilting rotary table was deduced in the tilt-angle nullity position where the upper surface of a circular dividing table becomes level, only when the aforementioned circular dividing table is deduced from the side by the clamper which went up the aforementioned pallet in the dividing angle nullity position in which carrying-in appearance is possible, a lock member is moved to an unlocking position and elevation of a clamper is attained. Since the stop section prepared in the Safety Department material interferes with a lock member and prevents elevation of the aforementioned clamper even if the selector valve which carries out the feeding and discarding of the fluid to the cylinder which makes it by this go up and down the aforementioned clamper during processing changes by incorrect operation, the work on the pallet which changed into the unclamping state completely is processed by the tool, and a pallet can be thrust down by cutting force or it can prevent damaging a tool or work. Moreover, since elevation of the aforementioned clamper is prevented even if the aforementioned selector valve is changed by incorrect operation when a tilting rotary table is deduced in an inclination position and the upper surface of a circular dividing table inclines, a pallet does not slide down from a circular dividing table.

[0008] In invention concerning the claim 2 constituted as mentioned above The aforementioned tilting rotary table is deduced in the tilt-angle nullity position where the upper surface of a circular dividing table becomes level. And only when the aforementioned circular dividing table is deduced from the side by the clamper which went up the aforementioned pallet in the dividing angle nullity position in which carrying-in appearance is possible The elevation of a lock plate prepared in the soffit of the Safety Department material which moved the lock member to the unlocking position and fixed to the clamper is permitted. Since the aforementioned lock plate was contained into the security slot which has opening which interferes with the aforementioned lock plate and prevents elevation of a lock plate when deduced in addition to the dividing angle predetermined position which the aforementioned circular dividing table deduces and includes an angle nullity position When the tilting rotary table is deduced in the inclination position, even if the aforementioned selector valve is changed by incorrect operation It can prevent that prevent elevation of the aforementioned clamper and a pallet slides down from the aforementioned circular dividing table, and when a circular dividing table deduces further and it is deduced in addition to the angle predetermined position, elevation of a clamper can be prevented certainly mechanically.

[0009] In invention concerning the claim 3 constituted as mentioned above A lock plate is formed in the soffit of the Safety Department material which fixed on the inferior surface of tongue of a clamper. When the aforementioned circular dividing table deduces and it is deduced in an angle nullity position, become in phase with the aforementioned lock plate, and elevation of this lock plate is permitted. Opening which interferes with the aforementioned lock plate and prevents elevation of a lock plate when deduced in addition to a dividing angle predetermined position. Since it prepared based on the security slot which has the opening which permits rotation of the aforementioned lock plate when the aforementioned circular dividing table deduced and rotated, after the aforementioned clamper had descended When a dividing table deduces and it is deduced in addition to the angle predetermined position, even if the aforementioned selector valve changes by incorrect operation, a lock plate can interfere with opening of a security slot, and can prevent elevation of a clamper certainly mechanically.

[0010]

[The gestalt of operation] The gestalt of operation of this invention is explained based on a drawing below. In drawing 1, 1 is the main part of the shape of a typeface of KO which carried out opening to the upper part, and is attached on the work table 2 of machine tools, such as a machining center. 3 is the tilting rotary table of the shape of a typeface of KO, and is supported by the supports 1a and 1b set up by the both sides of a main part 1 with the rocking shafts 4a and 4b which protruded horizontally from the both-arms sections 3a and 3b at the rockable. The rocking driving gears 5a and 5b which make a tilting rotary table 3 rock around the rocking axis 4

which is an axis of the rocking shafts 4a and 4b are attached in Supports 1a and 1b. Since the rocking driving gears 5a and 5b of both sides are the same, one rocking driving gear 5a is explained based on drawing 2, the same reference number with b is given to the portion which corresponds about another side, and explanation is omitted. Worm-gear 6a is attached in rocking shaft 4a, and worm 7a which geared to worm-gear 6a is supported by support 1a possible [rotation]. 8a is the servo motor fixed to support 1a, and rotation connection is carried out through gear-mechanism 9a at worm 7a. The rack ****(ed) by the center section of the piston which fitted into the interior possible [sliding] gears with the pinion attached in rocking shaft 4a, and it makes the pressure according to the rocking angle of a tilting rotary table 3 act on a piston, and makes it for 10a to be a cylinder for balance and balance with the torque based on rocking of a tilting rotary table.

[0011] In drawing 1 and 3, the circular dividing table 16 is supported possible [rotation] by the base 15 fixed to the tilting rotary table 3 in one around the rocking axis 4 and the right-angled dividing axis of rotation 17. A worm gear 18 is fixed to the inferior surface of tongue of a circular dividing table 16, and the rotation drive of the worm 19 which gears to this worm wheel 18 is carried out by the servo motor 20 (refer to drawing 5). A circular dividing table 16 is deduced with these worm gears 18, a worm 19, and a servo motor 20, and the rotation driving gear 12 deduced and rotated around axis of rotation 17 is constituted.

[0012] In drawing 3, 21 is the clamper which deduced on the circular dividing table 16 and was constructed across in the axis-of-rotation 17 direction possible [rise-and-fall movement]. is deduced to the piston rod of the pistons 23a and 23b which fit into the oil hydraulic cylinders 22a and 22b which deduced to the circular dividing table 16 and were drilled in parallel with axis of rotation 17, and is connected on both sides of axis of rotation 17. A means 24 to carry out rise-and-fall movement of the clamper 21 with oil hydraulic cylinders 22a and 22b and Pistons 23a and 23b is constituted. 25 is the pallet with which Work W is attached removable, and carrying-in appearance is carried out to the upper surface of a clamper 21 which went up from the side with the pallet carrying-in appearance equipment of ****. While a tilting rotary table 3 is deduced in the tilt-angle nullity position where the upper surface of a circular dividing table 16 becomes level at the time of the carrying-in appearance of this pallet 25, the circular dividing table 16 is deduced in the dividing angle nullity position in which the carrying-in appearance of the pallet by the aforementioned pallet carrying-in appearance equipment is possible. 26a and 26b are backing as the engagement section of a pallet 25, and when a pallet 25 is carried in on a clamper 21, they counter with the both-ends inferior surface of tongue of a clamper 21, the sheet with which a pallet 25 sits down when Backing 26a and 26b is caudad pressed by descent of a clamper 21 and a pallet 25 descends to the upper surface of the dividing table 16 — while Members 27a and 27b are formed, gage-pin 28a28b for fitting in with the tooling holes drilled in the inferior surface of tongue of Backing 28a and 28b, and positioning a pallet 16 on a circular dividing table 16 protrudes a sheet — a positioning means 29 to position a pallet 25 on a circular dividing table 16 by Members 27a and 27b and gage pins 28a and 28b is constituted

[0013] 30 is the Safety Department material which fixed on the inferior surface of tongue of a clamper 21, and has extended to a base lower part in the feed hole 31 which deduced at a circular dividing table 16 and the base 15, and was drilled by axis of rotation 17 and this heart, and 32, 33 is a lock plate as the stop section prepared in the Safety Department material 30, fixed in one to the soffit of the Safety Department material 30, and has extended horizontally in it, the lock with which 34a and 34b were constructed across horizontally possible [movement] toward the Safety Department material 30 in the base lower part — the lock which is a member and was fixed to the base 15 — a member — it is moved between a lock position and an unlocking position by the oil hydraulic cylinder equipments 35a and 35b as driving means 35 a lock — in a lock position, Members 34a and 34b march out above the lock plate 33 which descended, and it interferes in them with elevation of a lock plate 33, they prevent elevation of the Safety Department material 30, as a result a clamper 21, cancel interference with a lock plate 33 in an unlocking position, and permit elevation of a clamper 21 the base 15 — a lock — Members 34a and 34b are few — the security slot 36 is formed caudad, and when a clamper 21 descends, a lock plate 33 is contained When the configuration of the opening 37 of the security

slot 36 had turned into a slightly large abbreviation same configuration from the configuration of a lock plate 33 as shown in drawing 4, it becomes in phase with a lock plate 33, and elevation of a lock plate 33 is permitted, when a circular dividing table 16 deduces and it is deduced in an angle predetermined position, and deduced in addition to a dividing angle predetermined position, it interferes in it with a lock plate 33, and it prevents elevation of a lock plate 33. Although the position rotated 180 degrees from the dividing angle nullity position and the dividing angle nullity position deduces and it becomes an angle predetermined position when the opening 37 of a lock plate 33 and the security slot 36 serves as a configuration symmetrical with a point to the axis of rotation 17 of a circular dividing table 16, as shown in drawing 4. Although opening 37 aligns with a lock plate 33 and permits elevation of a lock plate 33 in drawing 4 when a circular dividing table 16 is deduced in the aforementioned dividing angle nullity position if the configuration for both corners on the diagonal line of the opening 37 of a lock plate 33 and the security slot 36 is changed mutually. When deduced in addition to a dividing angle nullity position, it interferes with a lock plate 33 and comes to prevent elevation of a lock plate 33. After the clasper 21 has descended, when a circular dividing table 16 deduces and rotates in the security slot 36, opening 37 is caudad formed for the opening 38 which permits rotation of a lock plate 33 in it.

[0014] The tilting index circular table of the operation gestalt constituted as mentioned above it is deduced in the degree position of tilt angle where it was attached on the work table of a machine tool, the synchronous control of the servo motors 8a and 8b was carried out based on the tilting instructions from the numerical-control equipment of ***, and it was ordered in the tilting rotary table 3. A servo motor 20 drives based on dividing rotation instructions, and processing of a request angle is performed by the tool by which the main shaft of a machine tool was equipped with the circular dividing table 16 at the work W with which it was ordered, and which deduced, was deduced by the angular position and attached in the pallet 25. In this case, the solenoid valve 40 is changed to the position shown in drawing 5, a pressure oil is supplied to the upper locus of Cylinders 22a and 22b, and Pistons 23a and 23b move caudad, and are dropping the clasper 21. the inferior surface of tongue of a clasper 21 presses caudad the backing 26a and 26b of a pallet 25 by this, and a pallet 25 is positioned to gage pins 28a and 28b -- having -- a sheet -- it is clamped on member 27a and 27b moreover, the solenoid valve 41 is changed to the position of drawing 5, and the oil hydraulic cylinder equipments 35a and 35b move forward -- having -- a lock -- Members 34a and 34b are moved to the lock position even if a solenoid valve 40 changes to an opposite side by incorrect operation in this state, a pressure oil is supplied to the lower locus of Cylinders 22a and 22b and Pistons 23a and 23b are energized up -- a lock plate 33 -- a lock -- it interferes with Members 34a and 34b, elevation of the Safety Department material 30 is regulated, a clasper 21 goes up, and a bird clasper can be completely prevented in the unclamping state. This processes the work W on the pallet 25 of an unclamping state completely, and a pallet 25 can be thrust down from a circular dividing table 16 by the cutting force by the tool, or it can prevent damaging a tool and Work W. Moreover, it can prevent a pallet's 25 sliding on the upper surface of the clasper 21 which inclined by tilting of a tilting rotary table 3, and falling from a circular dividing table 16.

[0015] If processing of Work W is completed, the work table of a machine tool is deduced in the exchange position of a pallet 25, a tilting rotary table 3 is deduced by servo motors 8a and 8b in a tilt-angle nullity position, and a circular dividing table 16 will deduce with a servo motor 20, and will be deduced in an angle-of-rotation nullity position. If the unlocking instruction contact 42 shown in drawing 6 by the unlocking instructions from a control unit in this state closes, since a tilting rotary table 3 and a circular dividing table 16 deduce, respectively in a tilt-angle nullity position and a dividing angle-of-rotation nullity position, are completed in them and closed, the solenoid 45 for unclamping will be energized and self-hold of the contacts 43 and 44 will be carried out by the contact 46, the contact 47 closes by energization of a solenoid 45, and a solenoid 48 energizes -- having -- a solenoid valve 41 -- changing -- the oil hydraulic cylinder equipments 35a and 35b -- changing -- a lock -- Members 34a and 34b retreat in an unlocking position. Then, a solenoid valve 40 changes, a pressure oil is supplied to the lower locus of Cylinders 22a and 22b, and a clasper 21 goes up, and gage pins 28a and 28b recede from the tooling holes of a pallet 25, and it unclamps a pallet 25. this time -- a lock -- since Members 34a

and 34b retreat from the upper surface of a lock plate 33 and a lock plate 33 is as in phase as the opening 37 of the security slot 36 -- a lock plate 33 -- a lock -- it cannot interfere with the opening 37 of Members 34a and 34b and the security slot 36, and the Safety Department material 30 and a clasper 21 can go up the time of a circular dividing table 16 being deduced from the side by the clasper 21 which went up the pallet 25 while the tilting rotary table 3 was deduced by these contacts 43 and 44 and the relay 45 grade in the tilt-angle nullity position where the upper surface of a circular dividing table 16 becomes level in the dividing angle nullity position in which carrying-in appearance is possible -- the oil hydraulic cylinder equipments 35a and 35b -- a lock -- the unlocking control means 48 which move Members 34a and 34b to an unlocking position are constituted. The pallet 25 which it unclamped is taken out from a clasper 21 by carrying-in appearance equipment, if the pallet 25 with which the new work W was attached is carried in on a clasper 21, a solenoid valve 40 will change, a clasper 21 descends with Pistons 23a and 23b, and a pallet 25 is clamped on a circular dividing table 16. If lock instructions are outputted from numerical-control equipment and the lock instruction contact 49 is closed, a solenoid 50 will be energized and self-hold will be carried out by the contact 51, if a valve 41 -- changing -- a lock -- Members 34a and 34b move forward in a lock position with the oil hydraulic cylinder equipments 35a and 35b. Then, the work table of a machine tool is moved to a processing position, and processing is performed to Work W.

[0016] The disk-like lock plate 61 with which the crevice 60 was established in the peripheral face part as shown in drawing 7 is fixed to the soffit of the Safety Department material 30. Shaft-orientations movement is regulated for a member 64 at the base 15, the lock plate 61 plate 61 -- inner circumference with a slightly large path -- a hole 62 and the aforementioned crevice 60, and the annular lock that has the heights 63 small a little with abbreviation isomorphism -- It supports possible [rotation] between the lock positions which the unlocking position, the heights 63, and the crevice 60 which heights 63 and a crevice 60 align and permit elevation of a lock plate 61 serve as an irregular train, and prevent elevation of a lock plate 61 -- a lock -- you may make it rotate a member 64 with oil hydraulic cylinder equipment 65

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the whole tilting index circular table concerning this invention.

[Drawing 2] It is drawing seen from the 2-way of drawing 1 .

[Drawing 3] It is the enlarged view of a circular-dividing-table portion.

[Drawing 4] It is four to 4 expanded sectional view of drawing 3 .

[Drawing 5] It is drawing having shown the hydraulic circuit of a tilting index circular table.

[Drawing 6] a lock — a member — it is the control circuit view of driving means

[Drawing 7] a lock — it is drawing showing the modification of a member

[Description of Notations]

1 [... A tilting rotary table, 4 / ... Rocking axis of rotation,] ... A main part, 2 ... A work table, 3 5a, 5b [... Base,] ... A rocking driving gear, 12 ... A rotation driving gear, 15 16 [... Servo motor,] ... A circular dividing table, 17 ... Dividing axis of rotation, 20 21 [... Pallet,] ... A clasper, 24 ... The means, 25 which carry out rise-and-fall movement of the clasper 26a, 26b ... Backing (engagement section), 28a, 28b ... Gage pin (pointing device), 30 [... Lock plate (stop section),] ... 31 The Safety Department material, 32 ... 33 A feed hole, 61 34a, 34b, 64 [... A security slot, 37 / ... Opening, 38 / ... A gap 48 unlocking control means.] ... A lock member, 35a, 35b, 65 ... Oil hydraulic cylinder equipment (lock a member driving means), 36

[Translation done.]

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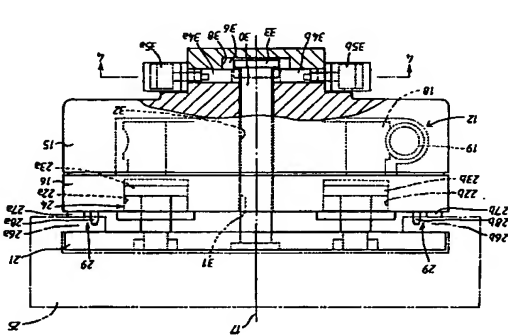
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(54)【発明の名称】 傾斜割出し円テーパー

(57)【要約】
【課題】 傾斜割出し円テーパーにおいて、傾斜テーパーが傾斜位置に昇降されているときに、パレットを昇降するクランパを昇降させる装置の作動を切替える切替弁が駆動動作により切替えられても、クランパの上昇を阻止してパレットが割出し円テーパーから滑り落ちないようにする。

【解決手段】 割出し円テーパーの中心孔を貫通してベースまで延在する保安部材を上昇したクランパの下面に固着し、ロック位置で保安部材に形成した係止部と干渉してクランパの上昇を阻止し、アンロック位置で係止部との干渉を解除してクランパの上昇を許容するロック部材をベースに移動可能に装架し、割出し円テーパーの上面が水平となる傾斜角零度位置に傾斜テーパーが割出されるように、パレットをクランパに搬入し可能な割出し角零度位置に割出し円テーパーが割出されたときにのみロック部材をアンロック位置に移動させる。



【特許請求の範囲】

【請求項1】 水平な揺動軸線回りに揺動可能に本体に支架された傾斜テーパーと、この傾斜テーパーを前記揺動軸線回りに揺動させる揺動駆動装置と、前記傾斜テーパーに一体的に固定されたベースに前記揺動軸線と直交する方向に、この割出し円テーパーを前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定され、このクランパの下面と対向する係合部が設けられ前記クランパの下面により前記係合部がクランパ下面により押圧されて前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定されるパレットとを設けた傾斜割出し円テーパーにおいて、前記クランパの下面に固着され前記割出し円テーパーの上面に位置決め手段により位置決めされた中心孔を貫通し前記ベースまで延在する保安部材と、前記ベースに移動可能に装架されロック位置において前記保安部材に設けられた係止部と干渉して前記クランパの上昇を阻止し、アンロック位置において前記係止部との干渉を解除してクランパの上昇を許容するロック部材と、このロック部材をロック位置とアンロック位置との間で移動させる揺動駆動手段と、前記割出し円テーパーの上面に水平となる傾斜角零度位置に前記傾斜テーパーが割出されると共に前記パレットを上昇したクランパに固着され搬入可能な割出し角零度位置に前記割出し円テーパーが割出されたときにのみ前記ロック部材が駆動手段により前記ロック部材をアンロック位置に移動させるアンロック制御手段とを備えたことを特徴とする傾斜割出し円テーパー。

【請求項2】 前記係止部を前記保安部の下端に一体的に設けられたロックパレットとし、前記割出し円テーパーが割出し角零度位置を含む割出し角所定位置に割出されたときは前記ロックパレットと同一位相となってロックパレットの上昇を許容し、割出し角所定位置以外に割出されたときは前記ロックパレットと干渉してロックパレットの上昇を阻止する開口部と、前記クランパが下降された状態で前記割出し円テーパーが割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定され、このクランパの下面と対向する係合部が設けられ前記クランパの下面により前記係合部がクランパ下面により押圧されて前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定されるパレットとを設けた傾斜割出し円テーパーにおいて、前記クランパの下面に固着され前記割出し円テーパーの上面に位置決め手段により位置決めされた中心孔を貫通し前記ベースまで延在する保安部材と、前記ベースに移動可能に装架されロック位置において前記保安部材に設けられた係止部と干渉して前記クランパの上昇を阻止し、アンロック位置において前記係止部との干渉を解除してクランパの上昇を許容するロック部材と、このロック部材をロック位置とアンロック位置との間で移動させる揺動駆動手段と、前記割出し円テーパーの上面に水平となる傾斜角零度位置に前記傾斜テーパーが割出されると共に前記パレットを上昇したクランパに固着され搬入可能な割出し角零度位置に前記割出し円テーパーが割出されたときにのみ前記ロック部材が駆動手段により前記ロック部材をアンロック位置に移動させるアンロック制御手段とを備えたことを特徴とする傾斜割出し円テーパー。

【請求項3】 水平な揺動軸線回りに揺動可能に本体に支架された傾斜テーパーと、この傾斜テーパーを前記揺動軸線回りに揺動させる揺動駆動装置と、前記傾斜テーパーに一体的に固定されたベースに前記揺動軸線と直交する方向に、この割出し円テーパーを前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定され、このクランパの下面と対向する係合部が設けられ前記クランパの下面により前記係合部がクランパ下面により押圧されて前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定されるパレットとを設けた傾斜割出し円テーパーにおいて、前記クランパの下面に固着され前記割出し円テーパーの上面に位置決め手段により位置決めされた中心孔を貫通し前記ベースまで延在する保安部材と、前記ベースに移動可能に装架されロック位置において前記保安部材に設けられた係止部と干渉して前記クランパの上昇を阻止し、アンロック位置において前記係止部との干渉を解除してクランパの上昇を許容するロック部材と、このロック部材をロック位置とアンロック位置との間で移動させる揺動駆動手段と、前記割出し円テーパーの上面に水平となる傾斜角零度位置に前記傾斜テーパーが割出されると共に前記パレットを上昇したクランパに固着され搬入可能な割出し角零度位置に前記割出し円テーパーが割出されたときにのみ前記ロック部材が駆動手段により前記ロック部材をアンロック位置に移動させるアンロック制御手段とを備えたことを特徴とする傾斜割出し円テーパー。

出し円テーパーの上面に前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定され、このクランパの下面と対向する係合部が設けられ前記クランパの下面により前記係合部がクランパ下面により押圧されて前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定されるパレットとを設けた傾斜割出し円テーパーにおいて、前記クランパの下面に固着され前記割出し円テーパーの上面に位置決め手段により位置決めされた中心孔を貫通し前記ベースまで延在する保安部材と、この保安部材の下端に一体的に設けられ前記保安部材に設けられた係止部と干渉して前記クランパの上昇を阻止し、アンロック位置において前記係止部との干渉を解除してクランパの上昇を許容するロック部材と、このロック部材をロック位置とアンロック位置との間で移動させる揺動駆動手段と、前記割出し円テーパーの上面に水平となる傾斜角零度位置に前記傾斜テーパーが割出されると共に前記パレットを上昇したクランパに固着され搬入可能な割出し角零度位置に前記割出し円テーパーが割出されたときにのみ前記ロック部材が駆動手段により前記ロック部材をアンロック位置に移動させるアンロック制御手段とを備えたことを特徴とする傾斜割出し円テーパー。

【発明の詳細な説明】

【0001】
【発明の属する技術分野】 本発明は、工作機械に装着する傾斜割出し円テーパーに関するものである。

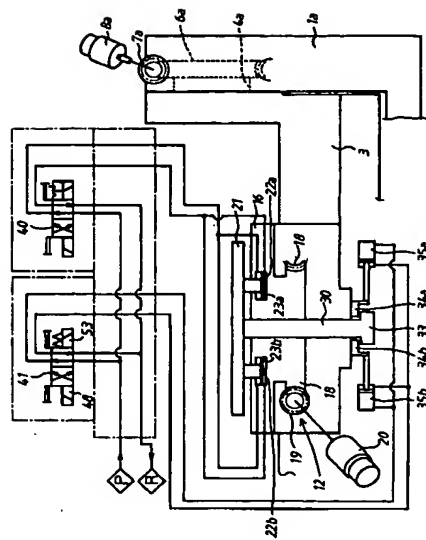
【0002】

【従来の技術】 本体に傾斜テーパーを水平な揺動軸線回りに揺動可能に支架し、前記傾斜テーパーに割出し円テーパーを前記揺動軸線と直交する方向に位置決め手段により位置決めされた状態で固定され、このクランパの下面と対向する係合部が設けられ前記クランパの下面により前記係合部がクランパ下面により押圧されて前記割出し円テーパーの上面に位置決め手段により位置決めされた状態で固定されるパレットとを設けた傾斜割出し円テーパーにおいて、前記クランパの下面に固着され前記割出し円テーパーの上面に位置決め手段により位置決めされた中心孔を貫通し前記ベースまで延在する保安部材と、前記ベースに移動可能に装架されロック位置において前記保安部材に設けられた係止部と干渉して前記クランパの上昇を阻止し、アンロック位置において前記係止部との干渉を解除してクランパの上昇を許容するロック部材と、このロック部材をロック位置とアンロック位置との間で移動させる揺動駆動手段と、前記割出し円テーパーの上面に水平となる傾斜角零度位置に前記傾斜テーパーが割出されると共に前記パレットを上昇したクランパに固着され搬入可能な割出し角零度位置に前記割出し円テーパーが割出されたときにのみ前記ロック部材が駆動手段により前記ロック部材をアンロック位置に移動させるアンロック制御手段とを備えたことを特徴とする傾斜割出し円テーパー。

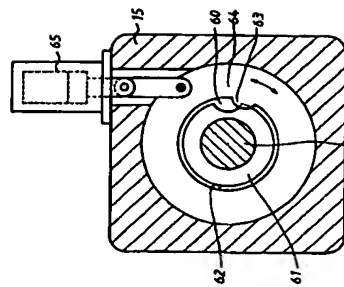
【0003】

【発明が解決しようとする課題】 このような従来の傾斜割出し円テーパーにおいては、クランパを昇降させる油圧シリンダの切替弁が、加工中に駆動動作により切替えられたとき、クランパが上昇し、完全にアンロック状態となったパレット上の工作物を工具により加工して工作物を切削力で突き落としたり、工具又は工作物を設備する可能性があった。また、傾斜テーパーが傾斜位置に割出されて割出し円テーパーの上面に傾斜しているときに、前記切替弁が駆動動作により切替えられたとき、前記クランパが上昇し、パレットが割出し円テーパーから滑り落ちる可能性があり、作業員にとって危険であると共に工作機械を損傷する虞があった。

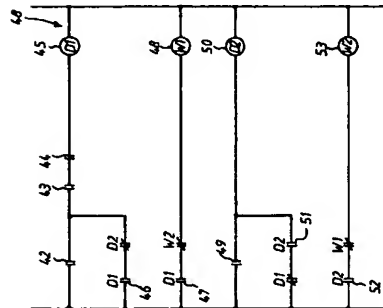
【図5】



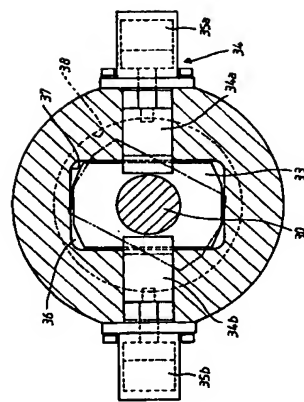
【図7】



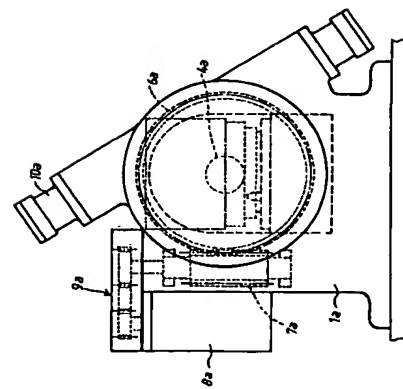
【図6】



【図4】



【図2】



【図3】

